



Mackenzie Valley Land and Water Board
7th Floor - 4922 48th Street
P.O. Box 2130
YELLOWKNIFE NT XIA 2P6
Phone (867) 669-0506
FAX (867) 873-6610

Staff Report

Applicant: De Beers Canada Inc. Snap Lake	
Location: Snap Lake, NT	Application: MV2011L2-0004
Date Prepared: August 5, 2015	Meeting Date: August 20, 2015
Subject: Request for the Removal of Rainbow Trout Toxicity Test from the Surveillance Network Program.	

1. Purpose/Report Summary

The purpose of this report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board) De Beers Canada Inc.'s (De Beers) June 5, 2015 request to change the Surveillance Network Program (SNP), annexed to Water Licence (Licence) MV2011L2-0004, for Board decision.

2. Background

- January 2, 2013 – De Beers submitted request to change the SNP chronic toxicity test from 70 day Early Life Stage (ELS) to 7 day ELS;
- April 25, 2013 – Board issued directive to De Beers to conduct a 30 day egg/alevin ELS test for Rainbow Trout using Method EPS/1/RM/28;
- September 24, 2013 – De Beers submits initial letter informing Board of the test invalidations;
- October 9, 2013 – De Beers submits a revised letter detailing possible options for the ELS;
- November 14, 2013 – Board issues direction to De Beers regarding ELS testing;
- May 6, 2014 – De Beers request to change the ELS test species from Rainbow Trout to Fathead Minnow (*Pimephales promelas*) and the timing from 30 days to 7 days;
- July 8, 2014 – De Beers submits additional information detailing recent issues with 30 day ELS test;
- July 17, 2014 – Board decision on the De Beers request requiring De Beers conduct both tests;
- June 5, 2015 – De Beers submits a letter, including a Golder Associates Ltd. supporting Technical Memorandum, requesting the change to the SNP;
- June 16, 2015 – The request was distributed for review; and
- August 20, 2015 – The request presented to the Board for decision.

3. Discussion

As listed in the Background section above, De Beers have made repeated requests to reduce the requirement for the Rainbow Trout ELS testing. The [July 17, 2014 Board directive](#) is the most recent Board decision made regarding the ELS testing. It states that:

De Beers is to conduct both 7 day tests for Rainbow Trout and Fathead Minnow for a minimum one year period. Following the one year period, De Beers could request to eliminate one of the tests if they have evidence to support the request.

As a result, SNP station 02-20 was changed to require that once yearly, a 7 day ELS test be conducted for both Rainbow Trout and Fathead Minnow. De Beers are now requesting to remove the requirement for the Rainbow Trout ELS test and only conduct the Fathead Minnow test.

In 2014 De Beers were able to successfully complete both 7 day tests (two Rainbow Trout and two Fathead Minnow). The tests were run twice following concerns with the August 4, 2014 Fathead Minnow test results. The test failed and indicated acute toxicity. De Beers initiated a second test to confirm results on August 26, 2014. The second test included both test species. No toxicity was found in either of the August 26, 2014 tests. In addition to the August 26, 2014 testing, De Beers also submitted a [Fish Early Life Stage Follow Up Investigation](#) looking into the possible cause of the August 4, 2014 Fathead Minnow toxicity results. One of the key findings of the report was that 'There was no clear cause identified for the degree of toxicity observed in the August 4 sample.'(pg-29).

During the 2011 Licence renewal, both Aboriginal Affairs and Northern Development Canada (since devolved to the Government of the Northwest Territories (GNWT)) and Environment Canada (EC) requested in their intervention that the Rainbow Trout ELS test be added to the SNP. In regards to the current request, EC submitted a letter stating that they do not oppose the proposed changes. The GNWT submitted comments recommending that both tests remain in the SNP for at least one more year to allow for additional information to warrant the removal of the Rainbow Trout test. The GNWT argue that:

At this time, ENR does not believe that enough evidence exists from the 1 comparative sample event (August 26, 2014) to warrant reduction of the toxicity testing requirements prescribed in the July 17, 2014 Board Decision. Results from tests conducted for Rainbow Trout (July 7th) and Fathead Minnow (August 4th) prior to the August 26th test dates indicate variable results and in the case for Rainbow Trout the response was statistically significant. Further, for the August 26th testing it appears that Rainbow Trout Embryo Viability showed a response to the 100% effluent whereas Fathead Minnow Larva Survival did not. This would mean that for these metrics, Rainbow Trout is more sensitive to Snap Lake effluent.

Therefore the GNWT recommended *'that the MVLWB require at least one more year of testing of Rainbow Trout and Fathead Minnow. ENR believes that given the variability seen in the 3 tests, 1 of which was the side-by-side test, that at least one more year of side-by-side testing would be required to make an informed decision.'*

In response, De Beers stated that *'Both De Beers and EC believe there is sufficient evidence to warrant reduction of the fish ELS toxicity testing requirements as requested. The data do not indicate that Rainbow Trout embryos are more sensitive than larval Fathead Minnow; both Rainbow Trout embryo tests showed only minor viability effects relative to controls.'*

4. Comments

N/A

5. Reviewer Comments

Comments and recommendations on the Request were submitted by the GNWT. EC submitted a letter stating that they do not oppose the proposed changes. No other comments were received. For a complete list of comments and responses, please refer to the Reviewer Comment Summary Table.

6. Security

N/A

7. Conclusion

There are two differing opinions on what the results indicate and whether or not there is sufficient evidence to support the change. The GNWT believes there is not enough evidence to support the request and De Beers believes there is.

8. Recommendation

Board staff recommends the Board consider the following options:

Option 1: The Board agree with GNWT that there is not enough evidence to warrant removing the Rainbow Trout ELS test. Therefore the SNP would remain as is for a least one more year.

Option 2: The Board agree with De Beers that there is sufficient information to warrant the removal of the Rainbow Trout ELS. Therefore SNP 02-20 will be changed to only require the Fathead Minnow 7 day ELS test.

Option 3: Board make a determination that it deems appropriate.

9. Attachments

- [June 5, 2015 De Beers request](#) to change ELS toxicity test;
 - [July 17, 2014 Board directive](#) regarding the ELS toxicity test;
- Reviewer Comment Summary Table;
- Draft Option One – Denial Letter from the Board;
- Draft Option Two – Approval Letter from the Board;
- Draft Change to Licence MV2011L2-0004;
- Draft Reasons for Decision – Denial; and
- Draft Reasons for Decision – Approval.

Respectfully Submitted,



Marc Casas
Regulatory Officer

Review Comment Table

Board:	MVLWB
Review Item:	MV2011L2-0004 - De Beers Snap Lake - Request to change ELS requirements of SNP
File(s):	MV2011L2-0004
Proponent:	De Beers Canada Inc. - Snap Lake
Document(s):	De Beers request to change ELS requirement of SNP June 5 2015 (95 kb) Board directive regarding ELS testing July 17 2014 (50kb)
Item For Review Distributed On:	June 16 at 16:57 Distribution List
Reviewer Comments Due By:	July 7, 2015
Proponent Responses Due By:	July 14, 2015
Item Description:	<p>On June 17, 2014 the MVLWB determined that early life stage (ELS) testing should be conducted for two fish species. De Beers have conducted tests for the past year and are requesting that the ELS test for Rainbow Trout be removed from the Surveillance Network Program (SNP). Please review the request to change the ELS testing requirements.</p> <p>Reviewer comments are due July 7, 2015.</p> <p>Proponent responses are due July 14, 2015.</p>
Contact Information:	Jen Potten 867-766-7468 Marc Casas 867-766-7466

Comment Summary

De Beers Canada Inc. - Snap Lake (Proponent)				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	Comment (doc) Duplicate excel file Recommendation		
Environment Canada: Sarah-Lacey McMillan				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
1	General File	Comment (doc) EC cover letter Recommendation		
GNWT - Environment and Natural Resources: Central Email GNWT				

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Response
5	General File	Comment (doc) ENR Letter with Comments and Recommendations Recommendation		
1	Topic 1: MVLWB Decision	Comment ENR notes that the requirement for ELS testing was established under the Snap Lake renewal licence in 2011 in which it was understood that TDS concentrations were trending upward in the effluent and within the lake itself. The testing was proposed to help understand the potential chronic toxicity that could occur to fish species in Snap Lake due to the increases in effluent concentration observed over time. The proposed and approved test method for Snap Lake was a 90-day ELS test. Since that time, as documented in the MVLWB reasons for decision from July 17, 2014, the testing was changed to a 30 day test and then a 7 day test due to concerns and logistical challenges that were relayed to the Board by De Beers. ENR also notes that recently De Beers has been approved to increase concentrations of TDS in its effluent on an interim basis to levels much higher than those experienced in 2014. Regarding the recent request before the Board, ENR has reviewed the decision by the MVLWB to include both the Rainbow Trout and Fathead Minnow toxicity tests for 100% effluent for a "minimum" of one year. ENR has also reviewed the results of the testing performed by De Beers in 2014. ENR notes that the Board decision does include the	July 14: De Beers notes that the recommendation for a fish early life stage test arose during the Snap Lake Water Licence Renewal Hearing as the result of a request from Environment Canada (EC). EC has agreed to De Beers' request to no longer continue testing both Rainbow Trout embryos and larval Fathead Minnow and to only test larval Fathead Minnow going forward (letter from EC). Both De Beers and EC believe there is sufficient evidence to warrant reduction of the fish ELS toxicity testing requirements as requested. The data do not indicate that Rainbow Trout embryos are more sensitive than larval Fathead Minnow; both Rainbow Trout embryo tests showed only minor viability effects relative to controls.	During the 2011 renewal process, both AANDC (Now GNWT – ENR water resources) and EC, requested the ELS test. EC accepted De Beers' request to remove the Rainbow Trout ELS test, however GNWT provided evidence to suggest keeping it for another year minimum. Board decision was to deny De Beers' request to remove the Rainbow Trout ELS test.

		<p>statement that "De Beers could request to eliminate one of the tests if they have evidence to support the request" (July 17, 2014, Reasons for Decision). At this time, ENR does not believe that enough evidence exists from the 1 comparative sample event (August 26, 2014) to warrant reduction of the toxicity testing requirements prescribed in the July 17, 2014 Board Decision. Results from tests conducted for Rainbow Trout (July 7th) and Fathead Minnow (August 4th) prior to the August 26th test dates indicate variable results and in the case for Rainbow Trout the response was statistically significant. Further, for the August 26th testing it appears that Rainbow Trout Embryo Viability showed a response to the 100% effluent whereas Fathead Minnow Larva Survival did not. This would mean that for these metrics, Rainbow Trout is more sensitive to Snap Lake effluent.</p> <p>Recommendation 1) ENR recommends that the MVLWB require at least one more year of testing of Rainbow Trout and Fathead Minnow. ENR believes that given the variability seen in the 3 tests, 1 of which was the side-by-side test, that at least one more year of side-by-side testing would be required to make an informed decision.</p>		
2	<p>Topic 2: August 4th Fathead Minnow Test Results</p>	<p>Comment Comment(s): The results from the August 4th Fathead Minnow testing are unexpected and concerning. The Golder memo indicates that the intent was to conduct both the Fathead Minnow and Rainbow Trout testing on this sample but</p>	<p>July 14: The information requested by GNWT-ENR is provided in Table 3-2 of the 2014 Fathead Minnow follow-up investigative report (Golder. 2014. Fish Early Life Stage Toxicity Test Follow-up Investigation.</p>	<p>Appropriate response as the requested values are in Table 3-2 of the Golder follow up investigation. TDS for August 4 was 298, which is within</p>

		<p>only the Fathead Minnow test was completed due to logistical considerations. It is unfortunate that the testing was not also completed for Rainbow Trout during this sampling event as well due to the extremely low % survival of the Fathead Minnow Larva in the 100% effluent. The Golder memo also states that survival also ranged from 25% to 65% in other testing concentrations. Replicate variability was also high in the lower sample concentrations ranging from 10% to 100%. ENR notes that the request to conduct both Rainbow Trout and Fathead Minnow testing was issued by the MVLWB on July 17, 2014. The samples collected by De Beers for the testing occurred on August 4th, 2014. It is not clear what the logistical challenges were for the company that would negate the testing requirement from the Board which was issued in the weeks prior to the August 4th testing.</p> <p>Recommendation 1) ENR recommends that De Beers also describe the concentrations of TDS and its constituents in the August 4th sampling event to help determine if the conditions were outside the normal operating range for the mine. The concentration for the August 26th sampling event should also be provided.</p>	<p>Report submitted to De Beers Canada Inc. October 2014.).</p>	<p>the normal range and in line with the other samples listed in the Table.</p>
3	None	<p>Comment None</p> <p>Recommendation 2) ENR requests that De Beers further describe the logistical challenges it faced during the August 4th sampling event that prevented the testing of Rainbow Trout and</p>	<p>July 14: On August 4, 2014 Rainbow Trout were not collected concurrently to the Fathead Minnow test due to a miscommunication within the environmental lab. This issue has since</p>	<p>Appropriate response.</p>

		any steps that have been taken by the company to avoid such challenges in the future.	been rectified and the operations procedure was updated to ensure that Water Quality data was collected at the same time as water to initiate the Fathead minnow and Rainbow Trout Tests.	
4	Topic 3: ELS Testing with Fathead Minnow - Rationale	<p>Comment DeBeers has stated that it is their opinion based on the results that it appears that "Fathead Minnow have similar or greater sensitivity than Rainbow Trout, depending on the analyte" (Golder Memo, page 2). ENR agrees that depending on the analyte the sensitivity of Rainbow Trout and Fathead Minnow may be different. As such, testing of Rainbow Trout and Fathead Minnow was required by the Board at the request of reviewers (see ENR's ELS comments from 2014). At this point, the fact that the cause of the toxicity failures in the August 4th sample event is unknown (TDS has many constituent and no TIE was run), and, the fact that Rainbow Trout testing was not performed on this same sample indicates to ENR that it remains inconclusive if Fathead Minnow are similar or more sensitive to Snap Lake effluent than Rainbow Trout. Further, it appears based on the memo that Golder is of the opinion that chloride is likely the cause of the toxicity but this has not yet been proven. Even relying upon the evidence provided by Golder in the May 27th, 2015 memo, biomass effects are only expected to be observed when concentrations are much higher than has been experienced in the Snap Lake effluent to date (33-day IC25 of 704 mg/L Cl and 56-</p>	<p>July 14: See Response to GNWT-ENR 1. Also, note that GNWT-ENR are incorrect in stating that the Golder technical memorandum provided the opinion that chloride was the likely cause of the observed toxicity. This was not stated in the technical memorandum. The Elphick et al. 2011 data on chloride were provided only as an example of the limited relevant data available for both fish species, not to attribute chloride as the cause of the observed toxicity.</p>	<p>Both sides have differing opinions on what the results indicate.</p> <p>Board decision was to deny De Beers' request to remove the Rainbow Trout ELS test.</p> <p>De Beers are correct in that the Golder document does not appear to indicate that Chloride is the likely toxicant. No references or quotes were provided by GNWT to substantiate this claim. One of the key findings of the document are that 'There was no clear cause identified for the degree of toxicity observed in the August 4 sample' pg 29 of Golder Report.</p>

	<p>day IC25 of 1,174 mg/L Cl; Elphick et al., 2011). Again, this evidence contributes to the uncertainty in the current understanding of TDS toxicity. The Elphick et al study and the testing on August 26, 2014 of the Snap Lake effluent suggests that the one of the two testing metrics used by Golder to advocate for Fathead Minnow testing alone is likely less sensitive than that for Rainbow Trout Embryo Viability for chloride (i.e. biomass).</p> <p>Recommendation 1) ENR recommends that the MVLWB require De Beers to continue the testing of Rainbow Trout and Fathead Minnow for at least one more year as the sensitivities of the two test species to various analytes in Snap Lake effluent is inconclusive.</p>		
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Environment Canada Environnement Canada

Environmental Protection Operations Directorate (EPOD)
Prairie and Northern Region (PNR)
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT X1A 2P7

July 7, 2015

EC file: 5100 000 034 004
MVLWB: MV2011L2-004

Jen Potten
Regulatory Officer
Mackenzie Valley Land and Water Board
7th Floor, 4922 48th St
PO Box 2130
Yellowknife, NT X1A 2P6

via online registry

RE: MV2011L2-004 - De Beers Canada Inc. - Snap Lake Mine request to change early life stage (ELS) requirements of surveillance network program (SNP)

Environment Canada (EC) has reviewed the information submitted to the Mackenzie Valley Land and Water Board (MVLWB) regarding the above-mentioned request and does not oppose the proposed changes. EC's specialist advice is provided pursuant to the *Canadian Environmental Protection Act, 1999*, the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act, 1994*, and the *Species at Risk Act*.

Should you require further information, please do not hesitate to contact me at (867) 669-4724 or sarah-lacey.mcmillan@ec.gc.ca.

Sincerely,

Sarah-Lacey McMillan
A/Head Environmental Assessment North (NT & NU), EPOD

cc: EC Review Team

July 7, 2015

Marc Casas
Regulatory Officer
Mackenzie Valley Land and Water Board
7th Floor – 4910 50th Avenue
P.O. Box 2130
Yellowknife, NT
X1A 2P6

Dear Mr. Casas,

**Re: DeBeers Canada Inc.
Water Licence – MV2011L2-0004
Request to Change ELS Requirements of SNP
Request for Comments**

The Department of Environment and Natural Resources has reviewed the document at reference based on its mandated responsibilities under the *Environmental Protection Act*, the *Forest Management Act*, the *Forest Protection Act*, *Waters Act* and the *Wildlife Act* and provides the following comments and recommendations for the consideration of the Board.

Topic 1: MVLWB Decision

Comment(s):

ENR notes that the requirement for ELS testing was established under the Snap Lake renewal licence in 2011 in which it was understood that TDS concentrations were trending upward in the effluent and within the lake itself. The testing was proposed to help understand the potential chronic toxicity that could occur to fish species in Snap Lake due to the increases in effluent concentration observed over time. The proposed and approved test method for Snap Lake was a 90-day ELS test. Since that time, as documented in the MVLWB reasons for decision from July 17, 2014, the testing was changed to a 30 day test and then a 7 day test due to concerns and logistical challenges that were relayed to the Board by De Beers. ENR also notes that recently De Beers has been approved to increase concentrations of TDS in its effluent on an interim basis to levels much higher than those experienced in 2014.

Regarding the recent request before the Board, ENR has reviewed the decision by the MVLWB to include both the Rainbow Trout and Fathead Minnow toxicity tests for 100% effluent for a “minimum” of one year. ENR has also reviewed the results of the testing performed by De Beers in 2014. ENR notes that the Board decision does include the statement that “De Beers could request to eliminate one of the tests if they have evidence to support the request” (July 17, 2014, Reasons for Decision).

At this time, ENR does not believe that enough evidence exists from the 1 comparative sample event (August 26, 2014) to warrant reduction of the toxicity testing requirements prescribed in the July 17, 2014 Board Decision. Results from tests conducted for Rainbow Trout (July 7th) and Fathead Minnow (August 4th) prior to the August 26th test dates indicate variable results and in the case for Rainbow Trout the response was statistically significant. Further, for the August 26th testing it appears that Rainbow Trout Embryo Viability showed a response to the 100% effluent whereas Fathead Minnow Larva Survival did not. This would mean that for these metrics, Rainbow Trout is more sensitive to Snap Lake effluent.

Recommendation(s):

- 1) ENR recommends that the MVLWB require at least one more year of testing of Rainbow Trout and Fathead Minnow. ENR believes that given the variability seen in the 3 tests, 1 of which was the side-by-side test, that at least one more year of side-by-side testing would be required to make an informed decision.

Topic 2: August 4th Fathead Minnow Test Results

Comment(s):

The results from the August 4th Fathead Minnow testing are unexpected and concerning. The Golder memo indicates that the intent was to conduct both the Fathead Minnow and Rainbow Trout testing on this sample but only the Fathead Minnow test was completed due to logistical considerations.

It is unfortunate that the testing was not also completed for Rainbow Trout during this sampling event as well due to the extremely low % survival of the Fathead Minnow Larva in the 100% effluent. The Golder memo also states that survival also ranged from 25% to 65% in other testing concentrations. Replicate variability was also high in the lower sample concentrations ranging from 10% to 100%.

ENR notes that the request to conduct both Rainbow Trout and Fathead Minnow testing was issued by the MVLWB on July 17, 2014. The samples collected by De Beers for the testing occurred on August 4th, 2014. It is not clear what the logistical challenges were for the company that would negate the testing requirement from the Board which was issued in the weeks prior to the August 4th testing.

Recommendation(s):

- 1) ENR recommends that De Beers also describe the concentrations of TDS and its constituents in the August 4th sampling event to help determine if the conditions were outside the normal operating range for the mine. The concentration for the August 26th sampling event should also be provided.
- 2) ENR requests that De Beers further describe the logistical challenges it faced during the August 4th sampling event that prevented the testing of Rainbow Trout and any steps that have been taken by the company to avoid such challenges in the future.

Topic 3: ELS Testing with Fathead Minnow - Rationale

Comment(s):

DeBeers has stated that it is their opinion based on the results that it appears that “Fathead Minnow have similar or greater sensitivity than Rainbow Trout, depending on the analyte” (Golder Memo, page 2).

ENR agrees that depending on the analyte the sensitivity of Rainbow Trout and Fathead Minnow may be different. As such, testing of Rainbow Trout and Fathead Minnow was required by the Board at the request of reviewers (see ENR’s ELS comments from 2014). At this point, the fact that the cause of the toxicity failures in the August 4th sample event is unknown (TDS has many constituent and no TIE was run), and, the fact that Rainbow Trout testing was not performed on this same sample indicates to ENR that it remains inconclusive if Fathead Minnow are similar or more sensitive to Snap Lake effluent than Rainbow Trout.

Further, it appears based on the memo that Golder is of the opinion that chloride is likely the cause of the toxicity but this has not yet been proven. Even relying upon the evidence provided by Golder in the May 27th, 2015 memo, biomass effects are only expected to be observed when concentrations are much higher than has been experienced in the Snap Lake effluent to date (33-day IC25 of 704 mg/L Cl and 56-day IC25 of 1,174 mg/L Cl; Elphick et al., 2011). Again, this evidence contributes to the uncertainty in the current understanding of TDS toxicity. The Elphick et al study and the testing on August 26, 2014 of the Snap Lake effluent suggests that the one of the two testing metrics used by Golder to advocate for Fathead Minnow testing alone is likely less sensitive than that for Rainbow Trout Embryo Viability for chloride (i.e. biomass).

Recommendation(s):

- 1) ENR recommends that the MVLWB require De Beers to continue the testing of Rainbow Trout and Fathead Minnow for at least one more year as the sensitivities of the two test species to various analytes in Snap Lake effluent is inconclusive.

Comments and recommendations were provided by ENR technical experts in the Water Resources Division and the North Slave Region and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM).

Should you have any questions or concerns please do not hesitate to contact Patrick Clancy, Environmental Regulatory Analyst, at (867) 920-6118 or email at patrick_clancy@gov.nt.ca.

Sincerely,



Patrick Clancy
Environmental Regulatory Analyst
Environmental Impact Assessment Section
Conservation, Assessment and Monitoring Division
Department of Environment and Natural Resources
Government of the Northwest Territories

GENERAL INSTRUCTIONS FOR EXCEL TEMPLATE:

1. Do not leave blank rows above or between comments.
2. Do not modify the instructions or the column headings (i.e. the top three rows).
3. Each comment must have a response.
4. All formatting will be lost when this file is uploaded to the Online Comment Table.
5. If necessary, adjust the cell width and height in order to view all text.

ID	Reviewer	Topic	Comment	Recommendation	Proponent Response Responses should be as specific as possible, referring directly to the Comment/Recommendation.
1	GNWT - Environment and Natural Resources: Central Email GNWT	Topic 1: MVLWB Decision	<p>ENR notes that the requirement for ELS testing was established under the Snap Lake renewal licence in 2011 in which it was understood that TDS concentrations were trending upward in the effluent and within the lake itself. The testing was proposed to help understand the potential chronic toxicity that could occur to fish species in Snap Lake due to the increases in effluent concentration observed over time. The proposed and approved test method for Snap Lake was a 90-day ELS test. Since that time, as documented in the MVLWB reasons for decision from July 17, 2014, the testing was changed to a 30 day test and then a 7 day test due to concerns and logistical challenges that were relayed to the Board by De Beers. ENR also notes that recently De Beers has been approved to increase concentrations of TDS in its effluent on an interim basis to levels much higher than those experienced in 2014.</p> <p>Regarding the recent request before the Board, ENR has reviewed the decision by the MVLWB to include both the Rainbow Trout and Fathead Minnow toxicity tests for 100% effluent for a “minimum” of one year. ENR has also reviewed the results of the testing performed by De Beers in 2014. ENR notes that the Board decision does include the statement that “De Beers could request to eliminate one of the tests if they have evidence to support the request” (July 17, 2014, Reasons for Decision).</p> <p>At this time, ENR does not believe that enough evidence exists from the 1 comparative sample event (August 26, 2014) to warrant reduction of the toxicity testing requirements prescribed in the July 17, 2014 Board Decision. Results from tests conducted for Rainbow Trout (July 7th) and Fathead Minnow (August 4th) prior to the August 26th test dates indicate variable results and in the case for Rainbow Trout the response was statistically significant. Further, for the August 26th testing it appears that Rainbow Trout Embryo Viability showed a response to the 100% effluent whereas Fathead Minnow Larva Survival did not. This would mean that for these metrics, Rainbow Trout is more sensitive to Snap Lake effluent.</p>	<p>1) ENR recommends that the MVLWB require at least one more year of testing of Rainbow Trout and Fathead Minnow. ENR believes that given the variability seen in the 3 tests, 1 of which was the side-by-side test, that at least one more year of side-by-side testing would be required to make an informed decision.</p>	<p>De Beers notes that the recommendation for a fish early life stage test arose during the Snap Lake Water Licence Renewal Hearing as the result of a request from Environment Canada (EC). EC has agreed to De Beers' request to no longer continue testing both Rainbow Trout embryos and larval Fathead Minnow and to only test larval Fathead Minnow going forward (letter from EC). Both De Beers and EC believe there is sufficient evidence to warrant reduction of the fish ELS toxicity testing requirements as requested. The data do not indicate that Rainbow Trout embryos are more sensitive than larval Fathead Minnow; both Rainbow Trout embryo tests showed only minor viability effects relative to controls.</p>

Comment(s):

The results from the August 4th Fathead Minnow testing are unexpected and concerning. The Golder memo indicates that the intent was to conduct both the Fathead Minnow and Rainbow Trout testing on this sample but only the Fathead Minnow test was completed due to logistical considerations.

It is unfortunate that the testing was not also completed for Rainbow Trout during this sampling event as well due to the extremely low % survival of the Fathead Minnow Larva in the 100% effluent. The Golder memo also states that survival also ranged from 25% to 65% in other testing concentrations. Replicate variability was also high in the lower sample concentrations ranging from 10% to 100%.

ENR notes that the request to conduct both Rainbow Trout and Fathead Minnow testing was issued by the MVLWB on July 17, 2014. The samples collected by De Beers for the testing occurred on August 4th, 2014. It is not clear what the logistical challenges were for the company that would negate the testing requirement from the Board which was issued in the weeks prior to the August 4th testing.

1) ENR recommends that De Beers also describe the concentrations of TDS and its constituents in the August 4th sampling event to help determine if the conditions were outside the normal operating range for the mine. The concentration for the August 26th sampling event should also be provided.

2) ENR requests that De Beers further describe the logistical challenges it faced during the August 4th sampling event that prevented the testing of Rainbow Trout and any steps that have been taken by the company to avoid such challenges in the future.

The information requested by GNWT-ENR is provided in Table 3-2 of the 2014 Fathead Minnow follow-up investigative report (Golder. 2014. Fish Early Life Stage Toxicity Test Follow-up Investigation. Report submitted to De Beers Canada Inc. October 2014.). On August 4, 2014 Rainbow Trout were not collected concurrently to the Fathead Minnow test due to a miscommunication within the environmental lab. This issue has since been rectified and the operations procedure was updated to ensure that Water Quality data was collected at the same time as water to initiate the Fathead minnow and Rainbow Trout Tests.

2 GNWT - Environment and Natural Resources: Central Email GNWT Topic 2: August 4th Fathead Minnow Test Results

3 GNWT - Environment and Natural Resources: Central Email GNWT None None

DeBeers has stated that it is their opinion based on the results that it appears that “Fathead Minnow have similar or greater sensitivity than Rainbow Trout, depending on the analyte” (Golder Memo, page 2).

ENR agrees that depending on the analyte the sensitivity of Rainbow Trout and Fathead Minnow may be different. As such, testing of Rainbow Trout and Fathead Minnow was required by the Board at the request of reviewers (see ENR’s ELS comments from 2014). At this point, the fact that the cause of the toxicity failures in the August 4th sample event is unknown (TDS has many constituent and no TIE was run), and, the fact that Rainbow Trout testing was not performed on this same sample indicates to ENR that it remains inconclusive if Fathead Minnow are similar or more sensitive to Snap Lake effluent than Rainbow Trout.

Further, it appears based on the memo that Golder is of the opinion that chloride is likely the cause of the toxicity but this has not yet been proven. Even relying upon the evidence provided by Golder in the May 27th, 2015 memo, biomass effects are only expected to be observed when concentrations are much higher than has been experienced in the Snap Lake effluent to date (33-day IC25 of 704 mg/L Cl and 56-day IC25 of 1,174 mg/L Cl; Elphick et al., 2011). Again, this evidence contributes to the uncertainty in the current understanding of TDS toxicity. The Elphick et al study and the testing on August 26, 2014 of the Snap Lake effluent suggests that the one of the two testing metrics used by Golder to advocate for Fathead Minnow testing alone is likely less sensitive than that for Rainbow Trout Embryo Viability for chloride (i.e. biomass).

1) ENR recommends that the MVLWB require De Beers to continue the testing of Rainbow Trout and Fathead Minnow for at least one more year as the sensitivities of the two test species to various analytes in Snap Lake effluent is inconclusive.

See Response to GNWT-ENR 1. Also, note that GNWT-ENR are incorrect in stating that the Golder technical memorandum provided the opinion that chloride was the likely cause of the observed toxicity. This was not stated in the technical memorandum. The Elphick et al. 2011 data on chloride were provided only as an example of the limited relevant data available for both fish species, not to attribute chloride as the cause of the observed toxicity.